FIG. 9 illustrates a fifth embodiment of the present invention. This integral air diffuser **520** is used in place of the air diffuser **20**, illustrated in FIG. **1**, for this embodiment. In this fifth embodiment, similar elements are similarly designated, but with 500 series numbers. The air diffuser **520** again is not formed from a separate plate, but now is integral with the throttle body **522**, with the lower set of vanes **562** and the upper set of vanes **564** mounted to the wall of the main bore **526** of the throttle body **522**. Again, one less part and seal need to be assembled, and the overall size of the structure can be reduced. On the other hand, this complicates the fabrication of the throttle body **522** and makes designing to avoid interference between the upper vanes **564** and the butterfly valve more significant, which may or may not be desirable for a given situation.

A sixth embodiment of the present invention is shown in FIG. **10**. This air diffuser **620** is used in place of the air diffuser **20**, illustrated in FIG. **1**, for this embodiment. In this sixth embodiment, similar elements are similarly designated, but with 600 series numbers. The upper set of vanes **664** and the lower set of vanes **662** now extend radially into the main bore **652**, with the upper set of vanes **664** shorter than the lower set **662** and tapered as they extend radially inward. The taper is done for the same potential interference reasons as with the first embodiment. The radially oriented vanes **662**,**664** can work as compared to parallel vanes, but are not generally as effective as with parallel spacing. The reason being that at throttle tip-in conditions, if the vane spacing is set to its maximum effectiveness at the outer radial locations of the vanes **662**,**664**, the proper diffusion and redirection of the air flow may not be as effective at the inner radial locations since the ends of the fins approach one another as they extend radially inward, thus changing the amount of gap between them.

FIG. **11** illustrates a seventh embodiment of the present invention. This air diffuser **720** is used in place of the air diffuser **20**, illustrated in FIG. **1**, for this embodiment. In this seventh embodiment, similar elements are similarly designated, but with 700 series numbers. The upper set of parallel vanes and the lower set of parallel vanes are really now just one continues set of vertical vanes **762**, along with the addition of parallel horizontal vanes **68**. This forms a full grid pattern of vanes. The thickness of these vanes is constant along the length of the vanes. While the full grid pattern is most effective for diffusing and redirecting the air flow and thus for attenuation of the noise, there are very substantial flow losses created due to the significant amount of blockage of the main bore **752**. This blockage will thus significantly reduce the maximum horsepower of the engine.

FIG. **12** illustrates an eighth embodiment of the present invention. This air diffuser **820** is used in place of the air diffuser **20**, illustrated in FIG. **1**, for this embodiment. In this eighth embodiment, similar elements are similarly designated, but with 800 series numbers. This embodiment employs the same parallel vertical vanes **862** as in the seventh embodiment, but without the addition of horizontal vanes. This is a compromise from the seventh embodiment, in that the noise attenuation will not be as great, but the blockage will also be less. For both the seventh and eighth embodiments, one must keep in mind that the location of the butterfly valve in the throttle body is important because of the potential for interference between the grid or line pattern and an edge of the valve when the valve is in certain open positions.

While certain embodiments of the present invention have been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

I claim:

1. An air intake system for controlling the flow of air into an internal combustion engine comprising:
   - a throttle body including a first bore wall defining a first portion of a main bore and a valve mounted within the first portion of the main bore, with the valve being movable to selectively restrict the flow of air through the main bore;
   - an intake manifold including a second bore wall defining a second portion of the main bore, with the second bore wall having an upstream end, and the manifold further including means for mounting the throttle body relative to the intake manifold such that the first and the second portions of the main bore align with one another, with the intake manifold being downstream of the throttle body, and with the manifold including an EGR inlet adjacent the upstream end of the second bore wall;
   - an EGR assembly mounted to the EGR inlet; and
   - air control means, located downstream of the valve within the main bore, for diffusing and redirecting the flow of air within the main bore such that less sound is generated within the intake manifold and less air recirculates back into the first portion of the main bore.

2. The air intake system of claim **1** wherein the air control means includes a plurality of vanes, spaced from one another, forming a first set, extending from one of the portions of the main bore wall into the main bore.

3. The air intake system of claim **2** wherein the first set of vanes is mounted to the first bore wall.

4. The air intake system of claim **2** wherein the first set of vanes are mounted to the second bore wall.

5. The air intake manifold of claim **2** wherein the vanes in the first set of vanes extend downstream into the second portion of the main bore.

6. The air intake system of claim **2** wherein the first set of vanes are oriented and extend radially relative to the main bore.

7. The air intake system of claim **6** wherein the first set of vanes taper as they extend away from one of the portions of the bore wall.

8. The air intake system of claim **6** wherein the air control means also include a second set of radial vanes, spaced from one another, extending into a different portion of the main bore than the first set.

9. The air intake system of claim **8** further including an air diffuser plate having a third bore wall defining a third portion of the main bore aligned with the first and the second portions of the main bore, with the air diffuser plate mounted between the throttle body and the intake manifold, and wherein the first and the second set of radial vanes are mounted to the third bore wall.

10. The air intake system of claim **8** wherein the average length of first set of radial vanes is shorter than the average length of the second set of radial vanes.

11. The air intake system of claim **2** wherein the first set of vanes are oriented and extend from a portion of the main bore wall parallel to and spaced from one another.

12. The air intake system of claim **11** wherein the air control means also includes a second set of parallel vanes, spaced from one another, extending from a different portion of the bore wall than the first set.

13. The air intake system of claim **12** wherein the air control means includes an air diffuser plate having a third bore wall defining a third portion of the main bore aligned with the first and second portion of the main bore, with the

air diffuser plate mounted between the throttle body and the intake manifold wherein the first and second set of parallel vanes are mounted on the third bore wall.

14. The air intake system of claim **1** wherein the second bore wall is defined by a diameter and the EGR inlet is located on the intake manifold within about one diameter of the upstream end of the second bore wall.

15. An air intake system for controlling the flow of air into an internal combustion engine comprising:

a throttle body including a first bore wall defining a first portion of a main bore and a valve mounted within the first portion of the main bore, with the valve being movable to selectively restrict the flow of air through the main bore;

an intake manifold including a second bore wall defining a second portion of the main bore, with the second bore wall having an upstream end, and the manifold further including means for mounting the throttle body relative to the intake manifold such that the first and the second portions of the main bore align with one another, with the intake manifold being downstream of the throttle body, and with the manifold including an EGR inlet adjacent the upstream end of the second bore wall;

an EGR assembly mounted to the EGR inlet;

an air diffuser plate having a third bore wall defining a third portion of the main bore aligned with the first and second portion of the main bore, with the air diffuser plate mounted between the throttle body and the intake manifold; and

air control means, located downstream of the valve within the main bore, for diffusing and redirecting the flow of air within the main bore such that less sound is generated within the intake manifold and less air recirculates back into the first portion of the main bore.

16. The air intake system of claim **15** wherein the air control means includes a plurality of vanes, spaced from one another, forming a first set, extending from one of the portions of the third bore wall into the main bore.

17. The air intake system of claim **16** wherein the air control means also includes a second set of vanes mounted to and extending from the third bore wall.

18. A method for controlling the air flowing through a bore of an intake manifold from an upstream located throttle body, having a bore with a valve therein, used with an internal combustion engine, the method comprising the steps of:

orienting the valve to allow air flow past the valve in the bore of the throttle body;

redirecting the air flow to create a generally uniform series of pairs of oppositely oriented adjacent vortices in the air flow downstream of the valve and upstream of at least a portion of the bore in the intake manifold;

feeding EGR gasses into the air flow just downstream of the location where the air flow is redirected;

flowing the air through the bore of the intake manifold; and

adding fuel to the air flow downstream of the location where the EGR gasses feed into the air flow.

19. The method of claim **18** wherein the step of redirecting the air flow includes providing vanes extending into the air flow downstream of the valve.

20. The method of claim **18** wherein the step of redirecting includes providing diffuser means for supporting vanes located between the throttle body and the intake manifold, and providing a plurality of vanes extending parallel to each other from the diffuser means into the air flow.

* * * * *